

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 62-297463

(43)Date of publication of application : 24.12.1987

(51)Int.Cl.

C23C 14/34  
B22F 9/20  
C22C 1/04  
C22C 27/02  
C23C 14/14

(21)Application number : 61-133802

(22)Date of filing : 11.06.1986

(71)Applicant : NIPPON MINING CO LTD

(72)Inventor : KYONO IWAO

HOSAKA KOJI

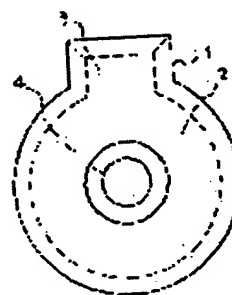
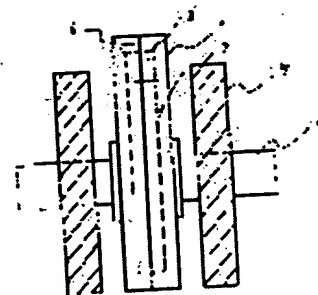
YAEGASHI SEIJI

## (54) HIGH PURITY METALLIC TANTALUM TARGET AND ITS PRODUCTION

## (57)Abstract:

PURPOSE: To obtain the titled target contg. extremely reduced amounts of alkali metals, radioactive elements, transition metals and high m.p. metals by crystallizing a Ta compound by fractional crystallization, reducing the resulting crystals to form high purity Ta powder, sintering and melting the powder, forming a metallic Ta ingot and working it.

CONSTITUTION: Metallic Ta or Ta<sub>2</sub>O<sub>5</sub> is dissolved in hydrofluoric acid or a mixed acid contg. hydrofluoric acid to prepare an aqueous soln. contg. Ta, an aqueous soln. contg. K ions is added and K<sub>2</sub>TaF<sub>7</sub> crystals are deposited to remove radioactive elements and high m.p. metals. The crystals are recovered and reduced with Na to form metallic Ta powder and a product contg. KF and NaF. The Ta powder is recovered by washing, compacted, sintered and melted to remove alkali metals and transition metals. The molten metal is formed into an ingot and the resulting metallic Ta ingot is worked to a desired shape. Thus, the titled target contg. ≤50ppb alkali metals, ≤5ppb radioactive elements, ≤3ppm transition metals and ≤3ppm high m.p. metals can be obtd.



---

**LEGAL STATUS**

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2000 Japan Patent Office

**TARGET MADE OF HIGHLY PURE METALLIC TANTALUM AND  
PROCESS FOR ITS PRODUCTION**

Patent Number: ☐ WO8707650  
Publication date: 1987-12-17  
Inventor(s): KYONO IWAO (JP); HOSAKA HIROSHI (JP); YAEGASHI SEIJI (JP)  
Applicant(s): NIPPON MINING CO (JP)  
Requested Patent: ☐ JP62297463  
Application Number: WO1987JP00365 19870609  
Priority Number(s): JP19860133802 19860611  
IPC Classification: C23C14/34  
EC Classification: C01G35/00, C01G35/00D, C22B34/24, C23C14/34B2  
Equivalents: ☐ DE3790259T, JP1905648C, JP6021346B  
Cited patent(s): JP58032010, JP49056810, JP60145304

**Abstract**

A target made of highly pure metallic tantalum having only extremely reduced amounts of alkali metals, radioactive elements, transition metals, and high-melting metals harmful for semiconductor devices. The target contains up to 50 ppb (0.05 ppm) of alkali metals, up to 5 ppb (0.005 ppm) of radioactive elements, up to 3 ppm of transition metals, and up to 3 ppm of high-melting metals. A process for producing the target is also disclosed. It comprises a combination of a wet purifying step mainly involving precipitation of potassium fluorotantalate ( $K_2TaF_7$ ) crystals and sodium reduction and a subsequent drying step. Sputtering using this target enables production of a high-quality  $Ta_2O_5$  insulating film and a metallic Ta electrode film.

Data supplied from the esp@cenet database - 12

# INTERNATIONAL SEARCH REPORT

International Application No PCT/JP87/00365

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC		
<div style="display: flex; justify-content: space-between; font-size: 1.2em;"> <span>Int.Cl<sup>4</sup></span> <span>C23C14/34</span> </div>		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched *		
Classification System	Classification Symbols	
IPC	C23C14/00-14/56	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched *		
<div style="display: flex; justify-content: space-between;"> <div>             Jitsuyo Shinan Koho              Kokai Jitsuyo Shinan Koho           </div> <div>             1926 - 1987              1971 - 1987           </div> </div>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> 14		
Category *	Citation of Document, 16 with indication, where appropriate, of the relevant passages 17	Relevant to Claim No. 18
A	JP, A, 58-32010 (Fujitsu Ltd.) 24 February 1983 (24. 02. 83) (Family: none)	1-2, 7
A	JP, A, 49-56810 (Ulvac Corporation) 3 June 1974 (03. 06. 74) (Family: none)	1-2, 7-9
A	JP, A, 60-145304 (Showa Cabot Super Metel Kabushiki Kaisha) 31 July 1985 (31. 07. 85) (Family: none)	3-6
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: 15</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"a" document member of the same patent family</p> </div> </div>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search *		Date of Mailing of this International Search Report *
August 5, 1987 (05. 08. 87)		August 24, 1987 (24. 08. 87)
International Searching Authority 1		Signature of Authorized Officer 19
Japanese Patent Office		

I. 発明の属する分野の分類			
国際特許分類 (IPC) Int. Cl. C23C14/34			
II. 国際調査を行った分野			
調査を行った最小限資料			
分類体系	分類記号		
IPC	C23C14/00-14/56		
最小限資料以外の資料で調査を行ったもの			
日本国実用新案公報		1926-1987年	
日本国公開実用新案公報		1971-1987年	
III. 関連する技術に関する文献			
引用文献の カテゴリー	引用文献名 及び一部の箇所が関連するときは、その関連する箇所の表示		請求の範囲の番号
A	JP, A, 58-32010 (富士通株式会社) 24. 2月. 1983 (24. 02. 83) (ファミリーなし)		1-2, 7
A	JP, A, 49-56810 (日本真空技術株式会社) 3. 6月. 1974 (03. 06. 74) (ファミリーなし)		1-2, 7-9
A	JP, A, 60-145304 (昭和キャボットスーパーメタル株式会社) 31. 7月. 1985 (31. 07. 85) (ファミリーなし)		3-6
<p>※引用文献のカテゴリー</p> <p>「A」 特に関連のある文献ではなく、一般的技術水準を示すもの</p> <p>「E」 先行文献ではあるが、国際出願日以後に公表されたもの</p> <p>「L」 優先権主張に疑義を提起する文献又は他の文献の発行日若しくは他の特別な理由を確立するために引用する文献 (理由を付す)</p> <p>「O」 口頭による開示、使用、展示等に言及する文献</p> <p>「P」 国際出願日前で、かつ優先権の主張の基礎となる出願の日の後に公表された文献</p> <p>「T」 国際出願日又は優先日の後に公表された文献であって出願と矛盾するものではなく、発明の原理又は理論の理解のために引用するもの</p> <p>「X」 特に関連のある文献であって、当該文献のみで発明の新規性又は進歩性がないと考えられるもの</p> <p>「Y」 特に関連のある文献であって、当該文献と他の1以上の文献との、当業者にとって自明である組合せによって進歩性がないと考えられるもの</p> <p>「&amp;」 同一パテントファミリーの文献</p>			
IV. 証			
国際調査を完了した日 05. 08. 87		国際調査報告の発送日 24.08.87	
国際調査機関 日本国特許庁 (ISA/JP)		権限のある職員 特許庁審査官 山 田 充	4 K 6 7 9 3

1/5/1

DIALOG(R)File 345:Inpadoc/Fam.& Legal Stat  
(c) 2002 EPO. All rts. reserv.

5597660

Basic Patent (No,Kind,Date): JP 61133802 A2 860621 <No. of Patents: 001>

PATENT FAMILY:

JAPAN (JP)

Patent (No,Kind,Date): JP 61133802 A2 860621  
MEASUREMENT DEVICE FOR CENTERING OF ROTARY SHAFT (English)  
Patent Assignee: TOKYO SHIBAURA ELECTRIC CO  
Author (Inventor): SATO FUMIHIRO; TAKETAKA HIROMI  
Priority (No,Kind,Date): JP 84255602 A 841205  
Applic (No,Kind,Date): JP 84255602 A 841205  
IPC: \* G01B-005/00; G01B-005/25  
Language of Document: Japanese

? s an=JP 61133802

S2 0 AN=JP 61133802

? s an=JP 61133802

S3 0 AN=JP 61133802

? s an=JP6113802

S4 0 AN=JP6113802

? s an=de 3790259/PR

S5 0 AN=DE 3790259/PR

? s an=de 3790259

S6 1 AN=DE 3790259

? t s6/5/all

6/5/1

DIALOG(R)File 345:Inpadoc/Fam.& Legal Stat  
(c) 2002 EPO. All rts. reserv..

8016757

Basic Patent (No,Kind,Date): WO 8707650 A1 871217 <No. of Patents: 005>

PATENT FAMILY:

GERMANY (DE)

Patent (No,Kind,Date): DE 3790259 C2 900208  
HOCHREINES METALLISCHES TANTALTARGET UND VERFAHREN ZU SEINER  
HERSTELLUNG (German)  
Patent Assignee: NIPPON MINING CO (JP)  
Author (Inventor): KYONO IWAO (JP); HOSAKA HIROSHI (JP); YAEGASHI  
SEIJI (JP)  
Priority (No,Kind,Date): WO 87JP365 W 870609; JP 86133802 A  
860611  
Applic (No,Kind,Date): DE 3790259 A 870609  
Filing Details: DE C2 D2 Grant of a patent after examination process  
IPC: \* C22B-034/24; C23C-014/08; C23C-014/34; H01L-021/316  
CA Abstract No: \* 108(16)136233J  
Derwent WPI Acc No: \* C 87-362737  
Language of Document: German

Patent (No,Kind,Date): DE 3790259 T 880623

HOCHREINES METALLISCHES TANTALTARGET UND VERFAHREN ZU SEINER  
HERSTELLUNG (German)

Patent Assignee: NIPPON MINING CO (JP)

Author (Inventor): KYONO IWAO (JP); HOSAKA HIROSHI (JP); YAEGASHI  
SEIJI (JP)

Priority (No,Kind,Date): WO 87JP365 W 870609; JP 86133802 A  
860611

Applic (No,Kind,Date): DE 3790259 A 870609  
IPC: \* C23C-014/14; C23C-014/34; C23C-014/08; C22B-034/20;  
H01L-021/316; C23C-014/30; H01L-021/283  
CA Abstract No: \* 108(16)136233J  
Derwent WPI Acc No: \* C 87-362737  
Language of Document: German

JAPAN (JP)

Patent (No,Kind,Date): JP 62297463 A2 871224  
HIGH PURITY METALLIC TANTALUM TARGET AND ITS PRODUCTION (English)  
Patent Assignee: NIPPON MINING CO  
Author (Inventor): KYONO IWAO; HOSAKA KOJI; YAEGASHI SEIJI  
Priority (No,Kind,Date): JP 86133802 A 860611  
Applic (No,Kind,Date): JP 86133802 A 860611  
IPC: \* C23C-014/34; B22F-009/20; C22C-001/04; C22C-027/02; C23C-014/14  
Language of Document: Japanese  
Patent (No,Kind,Date): JP 94021346 B4 940323  
Patent Assignee: JAPAN ENAJII KK  
Author (Inventor): KYONO IWAO; HOSAKA KOJI; YAEGASHI SEIJI  
Priority (No,Kind,Date): JP 86133802 A 860611  
Applic (No,Kind,Date): JP 86133802 A 860611  
IPC: \* C23C-014/14; B22F-009/20; C23C-014/34  
Language of Document: Japanese

WORLD INTELLECTUAL PROPERTY ORGANIZATION, PCT (WO)

Patent (No,Kind,Date): WO 8707650 A1 871217  
TARGET MADE OF HIGHLY PURE METALLIC TANTALUM AND PROCESS FOR ITS  
PRODUCTION (English)  
Patent Assignee: NIPPON MINING CO (JP)  
Author (Inventor): KYONO IWAO (JP); HOSAKA HIROSHI (JP); YAEGASHI  
SEIJI (JP)  
Priority (No,Kind,Date): JP 86133802 A 860611  
Applic (No,Kind,Date): WO.87JP365 A 870609  
Designated States: (National) DE; US  
Filing Details: WO 10000 With international search report  
IPC: \* C23C-014/34  
CA Abstract No: ; 108(16)136233J  
Derwent WPI Acc No: ; C 87-362737  
Language of Document: Japanese

?